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MERCHANDISE SECURITY SYSTEM WITH BREAKAWAY FEATURE

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BACKGROUND OF THE INVENTION

[0001] Embodiments of the present invention relate generally to security systems for protecting items of merchandise, such as consumer electronics products.

[0002] It is common practice for retailers to provide demonstration models of consumer electronics products, such as handheld devices, tablets, and laptop computers, so that a potential purchaser may examine the product more closely and test the operation of its features. A working demonstration model, however, increases the possibility that the demonstration model will be stolen or removed from the display area by an unauthorized person. As a result, demonstration models of consumer electronics products are typically protected by a security system that permits a potential purchaser to examine and operate the product, while reducing the likelihood that the demonstration model will be stolen or removed from the display area.

[0003] The security system displays an item of merchandise so that a potential purchaser can readily view and, in some instances, operate the item when making a decision whether to purchase the item. At the same time, the item of merchandise is usually physically secured on the security system so as to prevent, or at least deter, theft of the item. The merchandise display security system may also include an alarm that is activated to alert store personnel in the event that a shoplifter attempts to separate the item of merchandise from the security system.

DETAILED DESCRIPTION OF EMBODIMENTS OF THE INVENTION

[0004] Referring to the accompanying figures wherein identical reference numerals denote the same elements throughout the various views, embodiments of security systems according to the present invention for protecting an item of merchandise against theft or unauthorized removal are disclosed. The item of merchandise may be any item, including any number of consumer electronics products (e.g. hand-held device, cellular phone, smart phone, tablet, laptop computer, etc.). The security systems described herein are operable for securing the item of merchandise against theft or authorized removal, while at the same time permitting a potential purchaser to closely examine and operate the item of merchandise in a display area. The security system permits a potential purchaser to examine and test the item of merchandise, while reducing the likelihood that the item of merchandise will be stolen or removed from the display area by an unauthorized person. The systems shown and described herein are suitable for securing an item

of merchandise in a residential or commercial environment, as well as a retail environment, and furthermore, is not intended to be limited to use only as a security display device for protecting against theft and/or unauthorized removal.

[0005] According to one embodiment shown in FIG. 1, the security system 10 generally comprises a sensor 12 configured to be secured to an item of merchandise 14. The sensor 12 may be electrically connected to a connector 17 that is configured to electrically connect to an input jack of the item of merchandise 14. The security system 10 may also include a base 18 that is configured to removably support the sensor 12 and the item of merchandise 14 thereon. In some embodiments, the base 18 and the sensor 12 include one or more contacts 28, 40 for facilitating contact charging when the sensor is supported on the base. In addition, the security system 10 also includes a cable 20 that is coupled to the sensor 12 at one end and operably engaged with a recoiler 22 at an opposite end. As explained in further detail below, a sense circuit or loop may be defined through the cable, and the sense loop may be used to detect various security events associated with the cable, such as the cable being cut, shorted, and/or disconnected. The sensor 12 may also be used to detect security events associated with the sensor and/or the item of merchandise 14, such as the item of merchandise being removed from the sensor.

[0006] The sensor 12 may be secured to the item of merchandise 14 using any desired technique, such as an adhesive and/or mechanical brackets. The sensor 12 may have a variety of shapes and sizes for being secured to the item of merchandise 14. In one embodiment shown in FIG. 1, the sensor 12 may include a sensing device 15, such as a pressure or plunger switch, for detecting removal of the item of merchandise 14. In addition, the connector 17 may be configured to be removably inserted into the input jack of the item of merchandise 14. Thus, the sensor 12 and the item of merchandise 14 may be electrically connected via the connector 17. The sensor 12 may include a printed circuit board (PCB), circuitry, or the like. For example, the sensor 12 may include charging circuitry for facilitating power transfer between the base 18 and the item of merchandise 14. The connector 17 may be electrically connected to the PCB using various techniques, such as via a cable. In the illustrated embodiment, the connector 17 is mounted to and extends from the sensor 12 but could be positioned at other locations depending on the location of the input port of the item of merchandise 14.

[0007] As noted above, the sensor 12 may include one or more electrical contacts 28. In

some embodiments, the sensor 12 includes a plurality of electrical contacts 28. The electrical contacts 28 may be in electrical communication with the PCB in the sensor 12 and the connector 17. Alternatively, the electrical contacts 28 may be electrically connected to only the connector 17. In some embodiments, the sensor 12 may not supply power to the item of merchandise 14 when the item is lifted from the base 18. Rather, the item of merchandise 14 may operate using its own power source when lifted from the base 18.

[0008] The base 18 may be configured to be supported by a fixed support or display surface 25, such as a counter, shelf, fixture, or the like. The base 18 may be secured to the support surface 25 using any desired technique such as an adhesive, brackets, and/or fasteners. The base 18 may include one or more magnets 34 or magnetic material, and the sensor 12 may include or more magnets 36 or magnetic material for releasably holding the sensor on the base. The magnets 34, 36 may aid in aligning the item of merchandise 14 in a desired display orientation.

[0009] The security system 10 may include a recoiler 22 and a cable 20 as discussed above. The base 18 may include an opening for receiving the cable 20. As such, the cable 20 may be extended through the opening when the sensor 12 and the item of merchandise 14 are lifted from the base, and the cable may be retracted through the opening when the sensor and the item of merchandise are returned to the base. The recoiler 22 may be spring biased in some embodiments such that the cable 20 is automatically retracted within the recoiler. The recoiler 22 may be mounted to an underside of the support surface 25 (see, e.g., FIGS. 1 and 2), although in other embodiments, the recoiler may be mounted within the base 18. Furthermore, the recoiler 22 may be in electrical communication with the cable 20. In this regard, the cable 20 may include one or more electrical conductors 53 extending along the length of the cable. In some cases, the cable 20 may include a pair of conductors for defining a sense loop or circuit and conducting an electrical signal. In other cases, the cable 20 may include a single conductor, such as an optical conductor for conducting an optical signal (e.g., a fiber optic cable).

[0010] As discussed above, the base 18 may include one or more electrical contacts 40. The contacts 28, 40 of the base 18 and the sensor 12 are configured to align with one another and contact one another when the sensor is supported on the base. Thus, the base 18 and the sensor 12 are in electrical communication with one another when the sensor is supported on the base. The base 18 may be electrically connected to a power source 38 which is configured to provide power to the base and/or the one or more electrical contacts 40 in the base. The base 18 may

also include charging circuitry that is configured to facilitate power transfer from the external power source 38 and the electrical contacts 40. Thus, when the sensor 12 is supported on the base 18, power is able to be transferred between the contacts 28, 40 and to the sensor 12. The connector 17 is electrically connected to the sensor contacts 28 as power is delivered such that power is provided to the item of merchandise 14. Therefore, the item of merchandise 14 may be powered by power transferred thereto and may be used to charge a battery associated with the item of merchandise. In some embodiments, any voltage adaption occurs prior to being delivered to the sensor 12. Voltage adaption may be needed in order to accommodate different items of merchandise 14 that require different operating voltages. Any voltage adaption may occur prior to power being provided to the contacts 28 on the sensor 12. Thus, the sensor 12 and adapter cable 16 do not provide any voltage adaption. However, in other embodiments, the sensor 12 may include a resistor or other identifier that detects the voltage requirements of the item of merchandise 14 which provides a signal to the base 18 for adjusting the voltage as necessary before providing power to the sensor. Although the aforementioned embodiments describe that power may be transferred via contact charging, it is understood that other techniques could be used to transfer power to sensor 12 and the item of merchandise 14. For example, inductive charging functionality could be employed for transferring power.

[0011] In some cases, the base 18 and the sensor 12 may include an electrical contact that detects that the sensor is lifted off of the base. For example, the sensor 12 and base 18 may each include a contact that is configured to engage one another when the sensor is supported on the base. These contacts may not transfer power. However, the contact on the base 18 may communicate with the PCB to indicate when the sensor 12 has been lifted off of the base and to cease transferring power to the electrical contacts 28, 40. This arrangement of contacts may reduce arcing and power surges when the sensor 12 is placed back on the base 18 since power will no longer be transferred to the contacts on the base after the sensor is lifted.

[0012] It is understood that the cable 20 may be any suitable cord, tether, or the like. In addition, the cable 20 may include one or more electrical conductors for transmitting electrical, security, and/or communication signals. In addition, the cable 20 may be a single strand, multi-strand, or braided. The cable 20 may be flexible to facilitate extension and retraction relative to the recoiler 22, and in some embodiments, may be formed of a cut-resistant material. Furthermore, the cable 20 may have various cross sections, such as round or flat. In some

embodiments, the security system 10 may not include a recoiler 22. Thus, the cable 20 could be a straight or coiled cable that is coupled to the sensor 12 at one end and electrically connected to a base or an alarm unit at an opposite end.

[0013] An end of cable 20 may be mechanically, electrically, and/or optically connected to the sensor 12 and/or the base 18. Thus, in some embodiments, the cable 20 may not be electrically connected to the sensor 12 in any way, and the conductors in the cable are electrically isolated from the power transmitted to the sensor and the item of merchandise 14. In one embodiment, the sensor 12 may define an opening for receiving an end of the cable 20. In some embodiments, an end of the cable 20 includes an optical transceiver 42 for communicating with the sensor 12 and/or the item of merchandise 14. Likewise, the sensor 12 may include an optical transceiver 42 for communicating with the optical transceiver at the end of the cable 20. In other embodiments, an opposite end of the cable 20 may include an optical transceiver 42, such as the end operably engaged with the base 18 or recoiler 22. For example, one or more optical transceivers 42 may be located within the base 18, or otherwise operably engaged with the base, and be configured to communicate with one another for defining a sense loop. Thus, it is understood that the optical transceiver(s) 42 may be located at any desired location.

[0014] The optical transceivers 42 may be used to transmit optical signals in predetermined sequences or patterns, as well as receive optical signals and convert the optical signals into electrical signals. In one example, the optical transceivers 42 may be configured to rotate relative to one another. Moreover, FIG. 1 shows that in the case where the charging circuit and sense loop are separate and electrically isolated from another, a cable 64 may be used to electrically connect the base 18 and the input power source 38 along with any other data connections. In some embodiments, the optical transceivers 42 are configured to transfer data between the sensor 12 and the base 18 (and vice versa). As long as data is being sent and received by the sensor 12 and base 18, respectively, no security event occurs. Thus, in some cases, particular coded light signals may be unnecessary, although coded signals could be used in combination with data in other embodiments. Data may be communicated in any predetermined time interval to ensure that communication is maintained in the absence of a security event and detect when communication is lost when a security event occurs.

[0015] The optical transceivers 42 may be used to define a sense loop and detect various security events, such as when the cable 20 is cut or removed from the sensor 12 and/or the

connector 17 is removed from item of merchandise 14 in an unauthorized manner. It is understood that various types of sensing techniques may be used for detecting when the cable 20 is attached or detached from the sensor 12 and/or item of merchandise 14, as well as when the connector 17 is removed from the item of merchandise. For example, the optical transceiver at the end of the cable 20 may communicate an optical signal to the optical transceiver in the sensor 12 where the sensor can determine that the item of merchandise 14 and the cable 20 are secure. The optical transceiver 42 in the sensor 12 may then communicate an optical signal to the optical transceiver 42 at the end of the cable 20 to indicate that the item of merchandise 14 is secure. The optical signals may be coded in a particular manner that is recognizable and/or expected for determining whether a security event has occurred. Should the optical signals be interrupted or an unexpected optical signal is received, the base 18 or other alarm unit may detect the interruption and generate an alarm signal. For example, the base 18 or other alarm unit may be configured to generate an audible and/or a visible alarm. For example, FIG. 1 shows that the base 18 may include an alarm 60, such as a piezoelectric device, for generating an audible alarm. The sensor 12 may likewise include an alarm 58 for generating an audible and/or a visible alarm. The base 18 may be configured to be armed and/or disarmed via a key, such as a wireless key. For instance, FIG. 1 shows that the base 18 may include a port 62 for facilitating communication with a key. In some embodiments, the optical transceivers 42 are similar to that described in U.S. Patent Publ. No. 2016/0351029, entitled Merchandise Security System with Optical Communication, the contents of which are incorporated herein by reference in their entirety.

[0016] FIGS. 2 and 3 show another embodiment of a security system 100. In this embodiment, the security system 100 includes a sensor 120 configured to be removably seated on the base 180. Each of the sensor 120 and the base 180 may be similar to that described above. As discussed above, the sensor 120 may include a connector 170 that is configured to electrically connect to an input jack of the item of merchandise 14. In this embodiment, the connector 170 includes a cable that is hardwired to the sensor 120. In addition, the sensor 120 may include a sensing device 150, such as a pressure or plunger switch, for detecting removal of the item of merchandise 14. The security system 100 may also include a recoiler 220 as also discussed above. In this embodiment, the recoiler 220 is located below the support surface 25, although in other embodiments, the recoiler may be mounted within the base 180. Moreover, the base 180 may include a port 620 configured to communicate with a key similar to that disclosed above.

Moreover, the end of the recoiler cable 200 and the sensor 120 may each include an optical transceiver 42 as discussed above. The end of the recoiler cable 200 may include a releasable connector 500 that is configured to connect to the sensor 120 using a variety of techniques.

[0017] In another embodiment, a locking feature may be provided for locking the sensor 12 to the base 18. In this regard and with reference to FIG. 3, a lock mechanism 80 may be configured to lock the sensor 12 to the base 18 when the sensor is seated on the base 18 thereby prevent the cable 20 from being retracted relative to the base. Such a lock mechanism 80 may be useful for retailers who wish to secure the sensor 12 and item of merchandise 14 to the base 18, such as after hours, since the cable 20 will be inaccessible due to the inability to lift the sensor from the base. At least a portion of the lock mechanism 80, connector 500, and/or base 18 may be formed of metal for reinforcement and strength. In the locked position, however, the sensor 12 may be rotatable about the base 18. Thus, the sensor 12 and associated article of merchandise 14 may rotate at least partially about the base 18 (e.g., at least about 90 degrees), and may even rotate freely about the base. As such, even when in a locked position, a consumer is able to interact with the article of merchandise 14 including moving the article of merchandise between different display orientations.

[0018] In the illustrated embodiment, the lock mechanism 80 includes a locking member 82 that is configured to rotate between locked and unlocked positions. In this instance, the locking member 82 may be a proprietary fastener. In some embodiments, the locking member 82 may be configured to be rotated less than a complete revolution or turn in order to move between locked and unlocked positions. For instance, the fastener may be configured to be rotated a ¼ turn, ½ turn, or ¾ turn to move between the locked and unlocked positions. Various techniques may be employed to lock the sensor 12 to the base 18, including using more or more engagement members, camming mechanisms, etc. In some embodiments, the lock mechanism is similar to that disclosed in U.S. Application No. 15/505,181, entitled Systems and Methods for Locking a Sensor to a Base, the contents of which are incorporated herein by reference in their entirety.

[0019] In one embodiment, FIGS. 4-7 show an embodiment of a security system 250 similar to the embodiments discussed above. In this example, the security system 250 includes an anchor cable 260. The anchor cable 260 may be a steel cable in some embodiments. As shown in FIGS. 2-3, the anchor cable 260 may be attached to the base 180 at one end and to the recoiler 220 at an opposite end. For instance, as shown in FIG. 3, one of the anchor cable 260 may be

fixed within the base 180. As show in FIG. 5, the recoiler 220 may be configured to receive an end of the anchor cable 260 such that the anchor cable 260 is configured to slide therethrough. The anchor cable 260 may extend through an opening defined in the support surface 25, and have a stop member 262 sized larger than the opening in the recoiler to prevent the anchor cable from being removed from the recoiler. In the instance where the base 180 is secured to the support surface 25 with an adhesive, the base may be configured to be removed or break away from the support surface when a force exceeding the adhesive retention force is applied to the sensor 12 and/or base. In some cases, the sensor 120 may be locked to the base 180 as discussed above, such as with a lock mechanism 80, and the lock mechanism may have a retention force that is greater than the adhesive retention force between the base and the support surface. Moreover, the item of merchandise 14 may be secured to the sensor 120 using any combination of adhesive, brackets, or fasteners so as to have a greater retention strength than the adhesive fixing the base 180 to the support surface 25. Therefore, when the base 180 is removed from the support surface, the anchor cable 260 is configured to allow the base to be removed from the support surface 25 a predetermined distance before the anchor cable tethers the base to the support surface 25 or the recoiler 220 (see, e.g., FIG. 7). In some cases, the anchor cable 260 allows the base to be lifted a predetermined distance (e.g., 1 to 5 inches) off of the support surface 25. In this way, a thief may be unable to gain leverage in attempting to remove the item of merchandise from the sensor 120 and/or the base 180 due to the fact that the base is no longer securely fixed on the support surface 25. However, the anchor cable 260 is of a sufficient strength that does not easily allow the sensor 120, base 180, and item of merchandise 14 to be removed from the support surface 25.

[0020] It is understood that the anchor cable 260 may be any suitable tether, cord, cable, or the like. In addition, the anchor cable 260 may be purely mechanical and not include any electrical conductors. The anchor cable 260 is separate and independent of the cables 20, 64. Furthermore, the anchor cable 260 may be a single strand, multi-strand, or braided. The anchor cable 260 may be flexible, and in some embodiments, may be formed of a cut-resistant material. The anchor cable 260 may have various cross sections, such as round or flat.

[0021] The foregoing has described one or more embodiments of security systems for securing an item of merchandise from theft or unauthorized removal. Although various embodiments of the present invention have been shown and described, it will be apparent to

those skilled in the art that various modifications thereto can be made without departing from the spirit and scope of the invention. Accordingly, the foregoing description is provided for the purpose of illustration only, and not for the purpose of limitation.

That which is claimed is:

1. A security system for securing an item of merchandise from theft, the security system comprising:

a sensor configured to be coupled to the item of merchandise;

a base configured to removably support the sensor and the item of merchandise thereon, the base configured to be fixed to a support surface;

a cable configured to be connected to the sensor and to extend at least partially through the base, the cable defining a sense loop therethrough that is configured to detect unauthorized removal of the sensor from the cable or the item of merchandise; and

an anchor cable connected to the base, the anchor cable configured to tether the base relative to the support surface when the base is removed from the support surface.

2. The security system of Claim 1, further comprising a lock mechanism configured to lock the sensor to the base.

3. The security system of Claim 2, wherein the lock mechanism has a retention force that is greater than the retention force between the base and the support surface.

4. The security system of Claim 1, wherein the base is fixed to the support surface with an adhesive.

5. The security system of Claim 1, further comprising a recoiler connected to the cable.

6. The security system of Claim 1, wherein an end of the anchor cable is coupled to the recoiler.

ABSTRACT

Embodiments of the present invention are directed to security systems and methods for securing an item of merchandise from theft or unauthorized removal. For example, the security system may include a sensor configured to be coupled to the item of merchandise and a base configured to removably support the sensor and the item of merchandise thereon. The base is configured to be fixed to a support surface. The security system also includes a cable configured to be connected to the sensor, wherein the cable defines a sense loop therethrough configured to detect unauthorized removal of the sensor from the cable or the item of merchandise. In addition, the security system includes an anchor cable connected to the base, wherein the anchor cable is configured to tether the base relative to the support surface when the base is removed from the support surface.

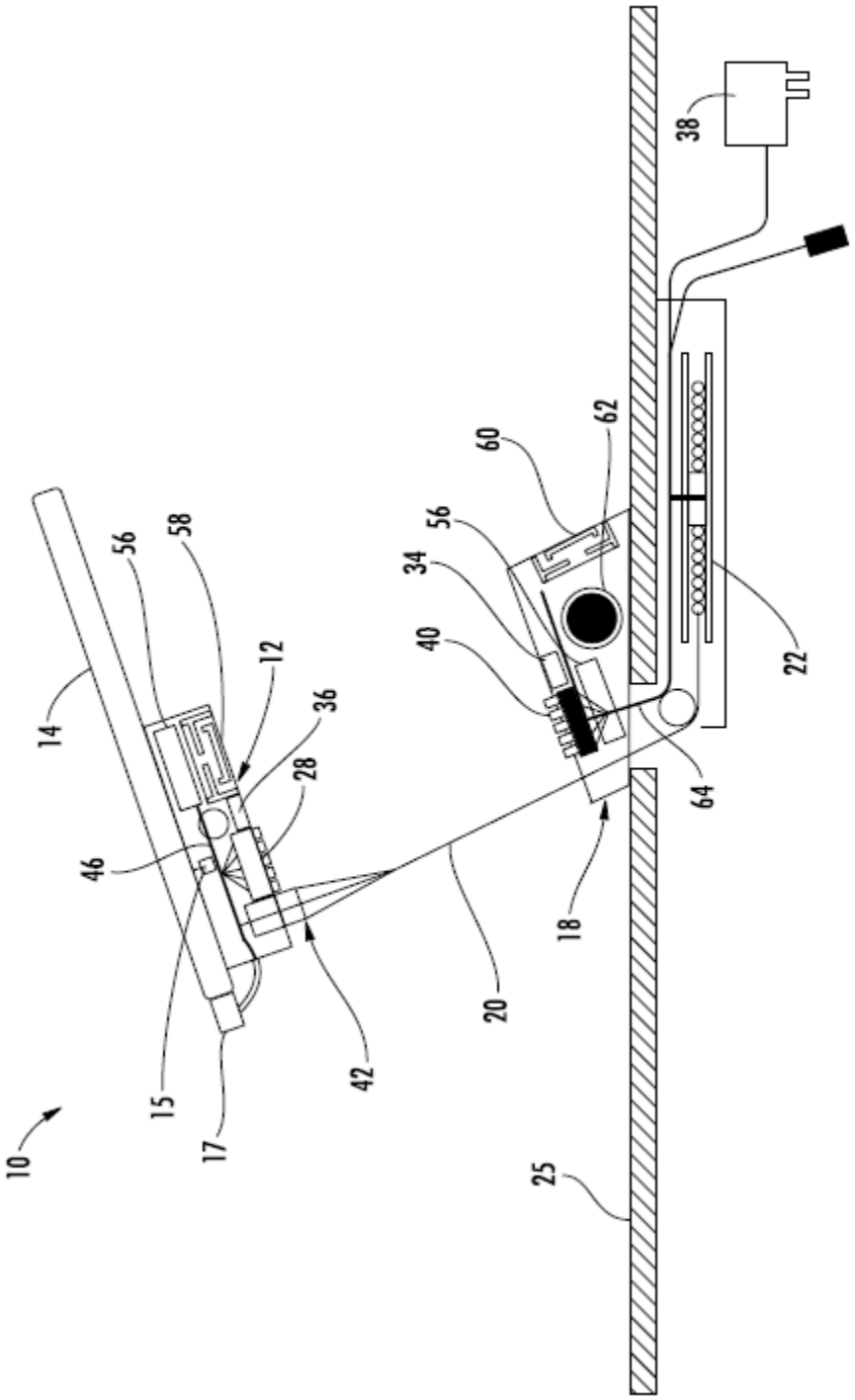

FIG. 1

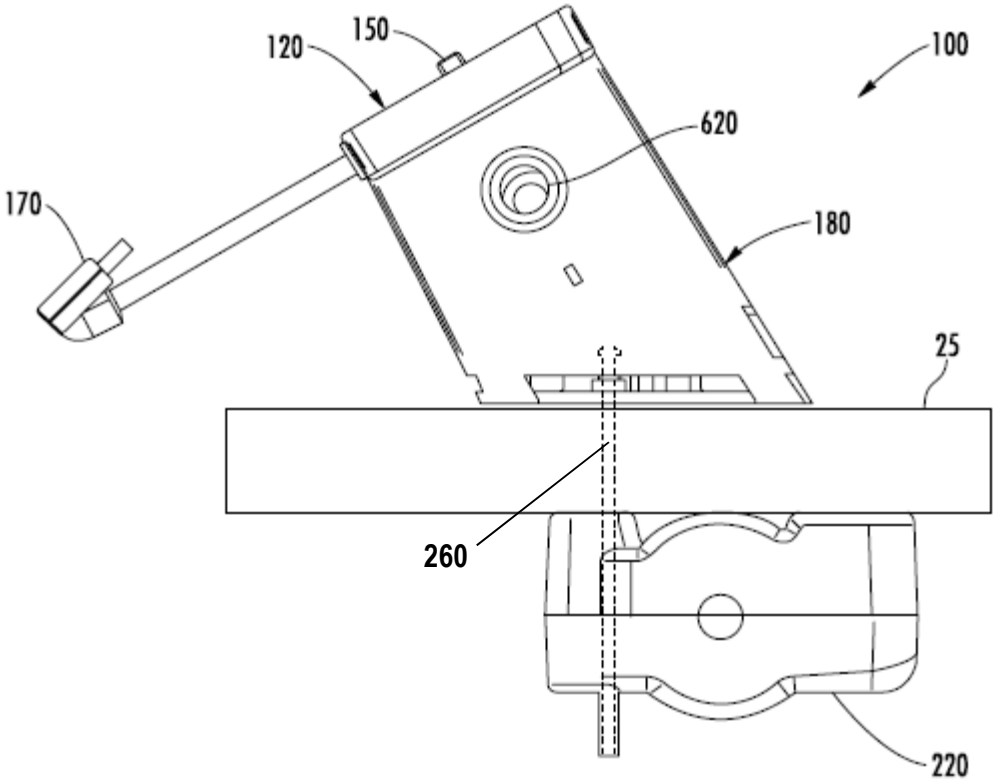

FIGURE 2

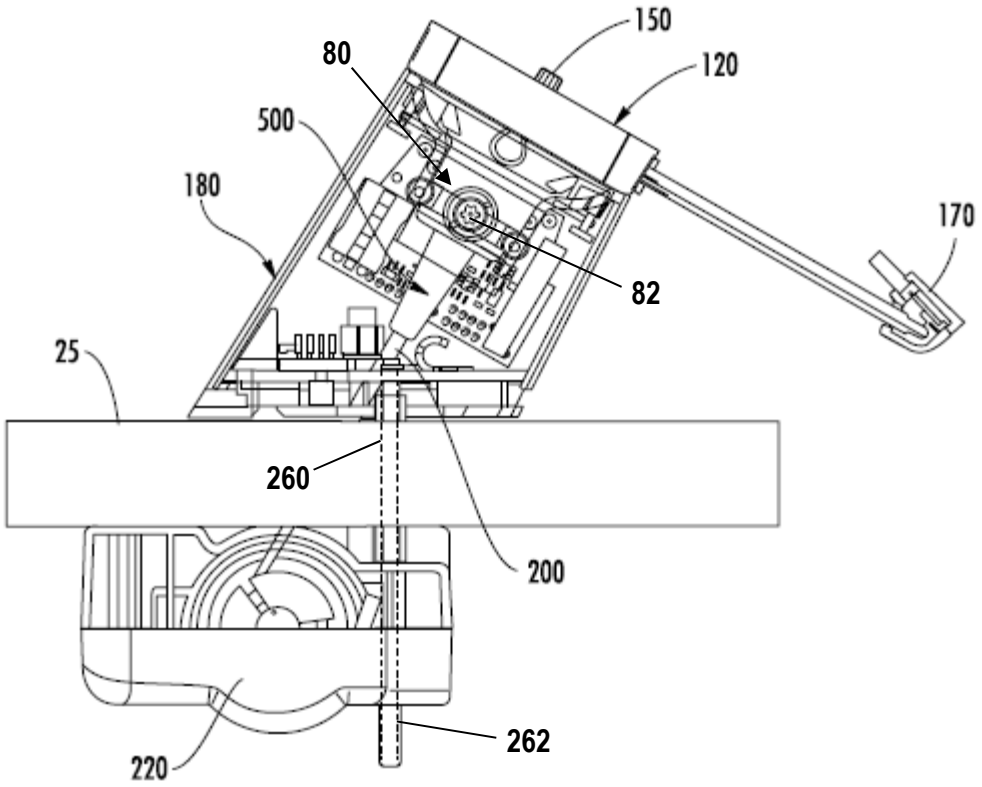

FIGURE 3

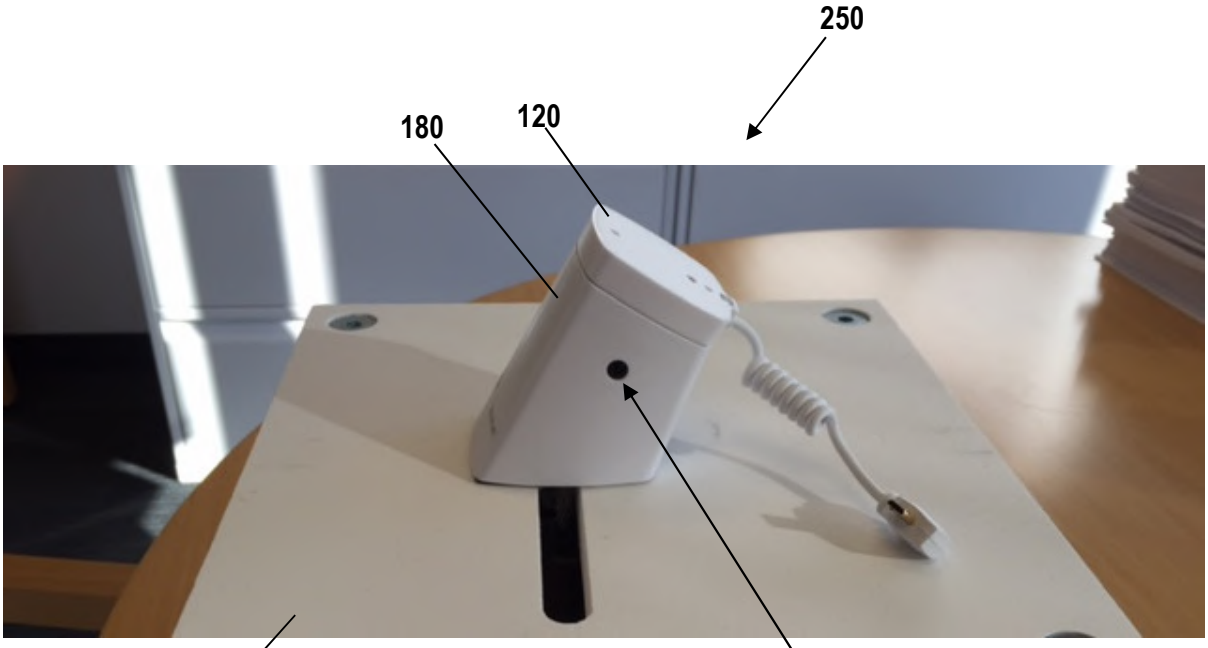

FIGURE 4

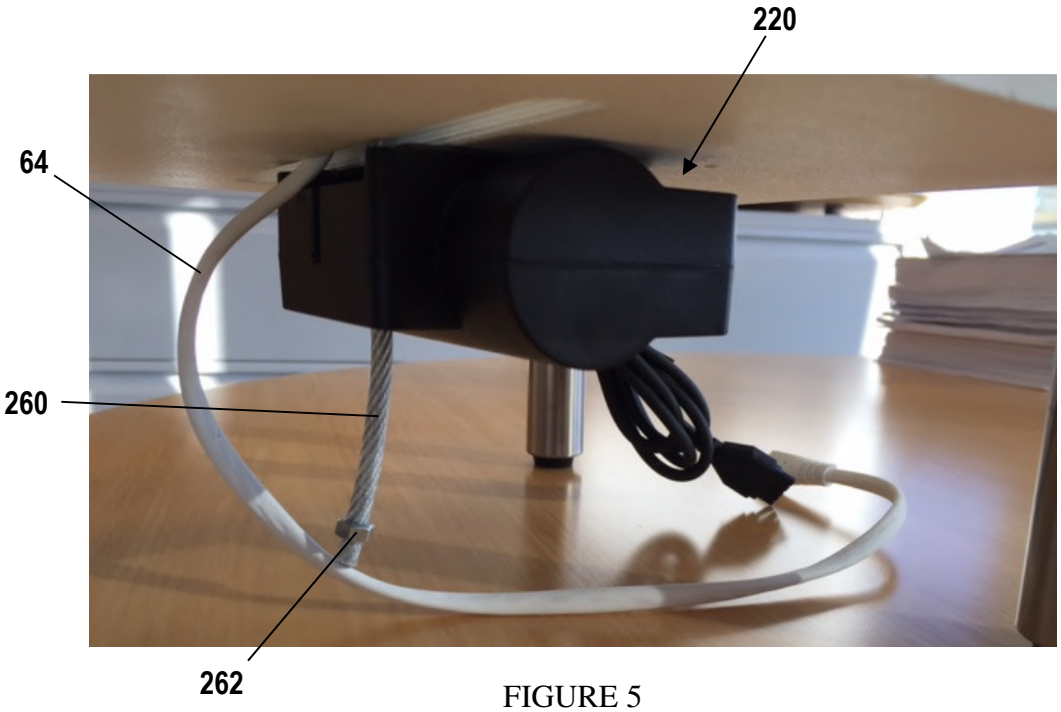

FIGURE 5

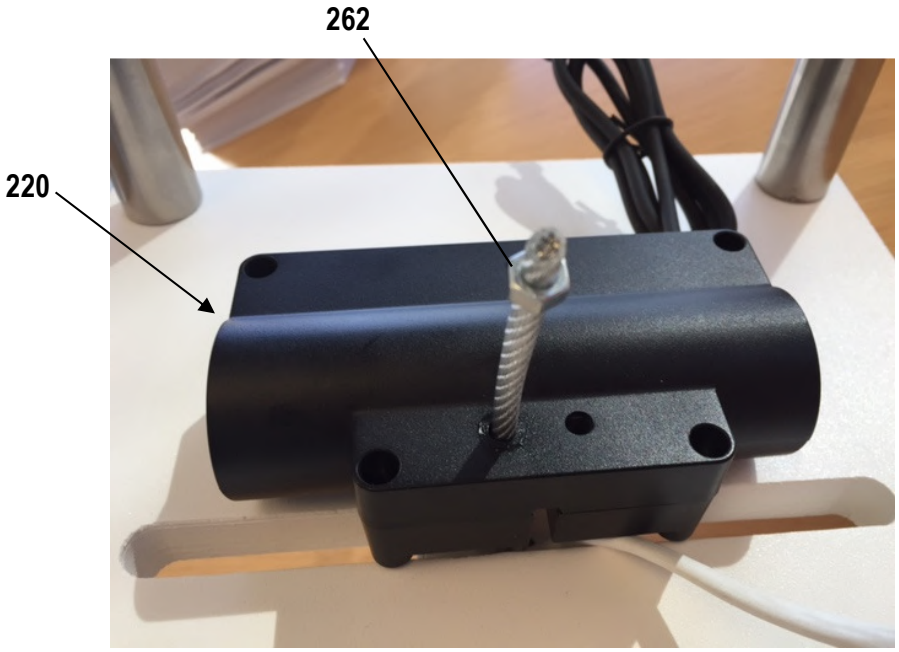

FIGURE 6

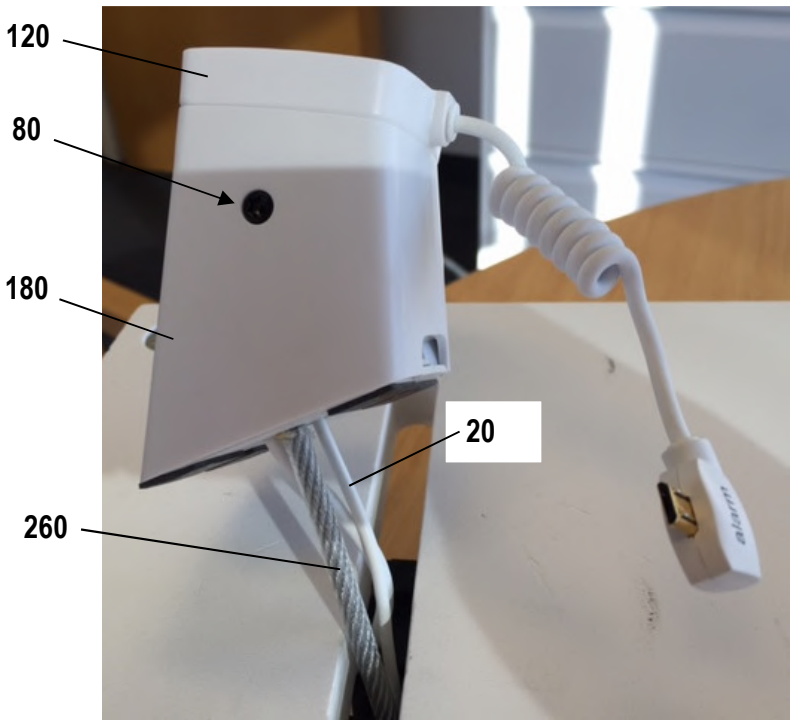

FIGURE 7